

# JAPAN

## EDICT OF GOVERNMENT

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JIS B 2408 (2005) (English): O-Rings: Quality  
Acceptance Criteria

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ISO INSIDE  
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*The citizens of a nation must  
honor the laws of the land.*

Fukuzawa Yukichi

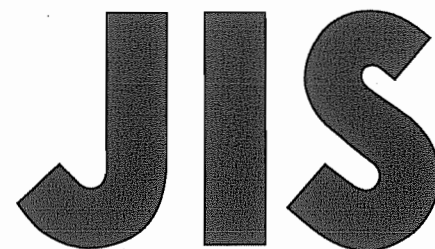
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JAPANESE  
INDUSTRIAL  
STANDARD

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JIS B 2408 : 2005  
(JFPA/JSA)

O-rings—Quality acceptance criteria



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Reference number : JIS B 2408 : 2005 (E)

2008年11月20日

## Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee, as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Fluid Power Association (JFPA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS B 2408 : 1993** is replaced with this Standard.

This revision has been made based on **ISO/FDIS 3601-3 : 2002** *Fluid power systems—O-rings—Part 3: Quality acceptance criteria* for the purpose of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

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Standards Board

Technical Committee on Machine Elements

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In the event of any doubts arising as to the contents,  
the original JIS is to be the final authority.

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## O-ring—Quality acceptance criteria

**Introduction** This Japanese Industrial Standard has been prepared based on the first edition of **ISO/FDIS 3601-3** *Fluid power systems—O-rings—Part 3: Quality acceptance criteria* published in 2002 with some modifications of the technical contents.

The portions given sidelines or dotted underlines are the matters modified from the original International Standard. A list of modifications with the explanations is given in Annex (informative).

**1 Scope** This Standard defines and classifies surface imperfections on O-rings and specifies maximum acceptable limits for these imperfections.

Remarks 1 This Standard only specifies the visual quality acceptance criteria of O-rings and is not intended to be used, by itself, to evaluate the conformity of O-rings.

2 The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

ISO/FDIS 3601-3:2002 *Fluid power systems—O-rings—Part 3: Quality acceptance criteria* (MOD)

**2 Normative reference** The following standard contains provisions which, through reference in this text, constitute provisions of this Standard. If the indication of the year of publication is given to the referred standard, only the edition of the indicated year constitutes the provision of this Standard but the revision and amendment made thereafter do not apply. The normative reference without the indication of the year of coming into effect applies only to the most recent edition (including amendments).

JIS B 0142 *Glossary of terms for oil hydraulics and pneumatics*

NOTE : **ISO 5598**:1985 *Fluid power systems and components—Vocabulary* is equivalent to the said standard.

**3 Terms and definitions** For the purposes of this Standard, the terms and definitions given in **JIS B 0142** and the following apply.

**3.1 backrind** longitudinal imperfection in which the rubber adjacent to the flash line shrinks below the level of the moulding and has a U-like or W-like cross section with the flash frequently being ragged or torn (see figure 1)

**3.2 combined flash** combination of offset, flash and parting line projection

**3.3 excessive trimming** flattened and often roughened area around the inner and/or outer diameters of an O-ring, caused by the trimming process (see figures 2A and 2B)



**3.4 flash** film-like material which extends from the parting line projection or inner and/or outer diameters, caused by mould separation or present due to inadequate trimming (see figure 3)

**3.5 flow marks** thread-like recesses, usually curved, or very slight depth in the unflexed state, with normal surface texture and round edge, caused by incomplete flow and knit of the material (see figure 4)

**3.6 foreign material** any extraneous matter embedded in the surface of the O-ring such as contamination and dirt

**3.7 indentations** depressions, usually irregular in form, caused by the removal of inclusions from the surface or the build up of hardened deposits on the surface of the mould cavity (see figure 5)

**3.8 mismatch** cross-sectional radius in one ring half being unequal to that of the other half, caused by dimensional difference in mould halves (see figure 7)

**3.9 non-fills** randomly spaced, irregularly shaped surface indentations having a coarser texture than the normal O-ring surface (see figure 6)

Information : This is caused by incomplete filling of the mould cavity and by entrapment of air.

**3.10 off register** misalignment of O-ring halves, caused by the lateral shift of one mould cavity plate relative to other (see figure 7)

**3.11 offset** mismatch and/or off register of O-ring halves (see figure 7)

**3.12 parting line indentation** shallow saucer-like recess sometimes triangular in shape, located on the parting line at the inner and/or outer diameters, caused by deformation of the mould edge at the parting line

**3.13 parting line projection** continuous ridge of material situated at the parting line of inner and/or outer diameters caused by worn or excessively rounded edges of the mould cavity

**4 Symbols** The following symbols are used in this Standard:

$d_1$  O-ring inside diameter;

$d_2$  O-ring cross-section diameter.

## 5 Grades

**5.1 Grade N (general)** This grade identifies acceptance criteria for O-rings intended for general usage applications.

**5.2 Grade S (special)** This grade identifies acceptance criteria for O-rings intended for applications requiring a higher level of quality/precision with respect to dimensional tolerances of surface imperfections.

For example, aerospace applications are covered by this grade.

## 6 Surface condition

**6.1** The O-ring surfaces shall be free from cracks, ruptures, blisters or other imperfections for which the limits are greater than those given in attached table 1 when the unstretched ring is viewed under a  $\times 2$  illuminated magnifier viewer. Other methods may be used by agreement between the manufacturer and the user.

**6.2** There shall be no foreign material embedded in the surface visible under the viewing conditions of **6.1**.

**6.3** Flow marks, non-fills and indentations within the limits of attached table 1 shall not be allowed if

- a) there are more than three in any 25 mm length of circumference;
- b) they interconnect;
- c) there are more than three which are separated from each other by a distance which is less than the maximum limiting dimensions of such imperfection.

**6.4** There shall be no flow marks which are essentially radially orientated.

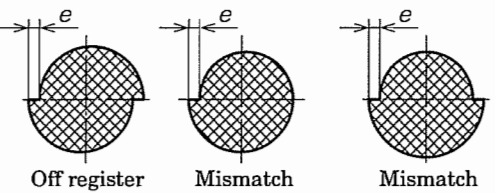
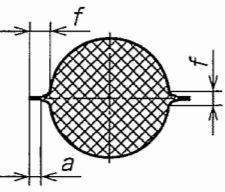
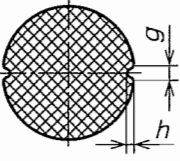
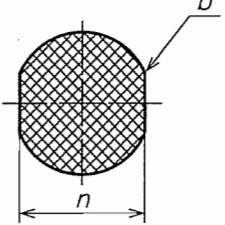
**6.5** The surface resulting from any excessive trimming shall be smoothly blended.

**7 Identification statement (reference to this Standard)** Manufacturers are strongly recommended to use the following statement in test reports, catalogues and sales literature when electing to comply with this Standard.

"Surface imperfection limits are in accordance with **JIS B 2408 O-rings—Quality acceptance criteria**".

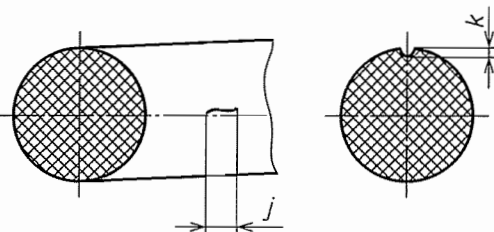
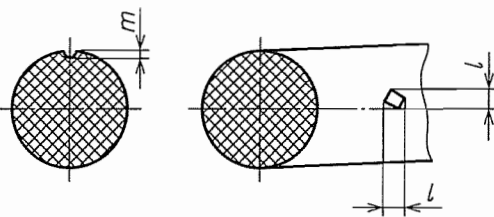
Attached Table 1 Limits of size for surface imperfections

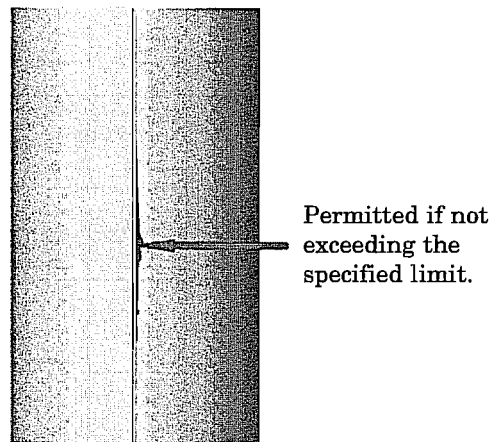
Unit: mm

Surface imperfection type	Diagrammatic representation	Limiting dimension	Maximum limits of imperfections									
			Grade N O-rings with cross section $d_2$					Grade S O-rings with cross section $d_2$				
			$\leq 1.8$	$1.8 < \leq 2.65$	$2.65 < \leq 3.55$	$3.55 < \leq 5.3$	$5.3 < \leq 8$	$\leq 1.8$	$1.8 < \leq 2.65$	$2.65 < \leq 3.55$	$3.55 < \leq 5.3$	$5.3 < \leq 8$
Off register, mismatch (offset)		$e$	0.08	0.10	0.13	0.15	0.15	0.08	0.08	0.10	0.12	0.13
Combined flash (combination of offset, flash and parting line projection)		$f$	0.10	0.12	0.14	0.16	0.18	0.10	0.10	0.13	0.15	0.15
		$a$	—					When the flash can be differentiated, it shall not exceed 0.05 mm.				
Backrind		$g$	0.18	0.27	0.36	0.53	0.70	0.10	0.15	0.20	0.20	0.30
		$h$	0.08	0.08	0.10	0.10	0.13	0.08	0.08	0.10	0.10	0.13
Excessive trimming (radial tool marks not allowed)		$n$	Trimming is allowed provided the dimension $n$ is not reduced below the minimum diameter $d_2$ for the O-ring.									
		$b$	It shall be smooth.									

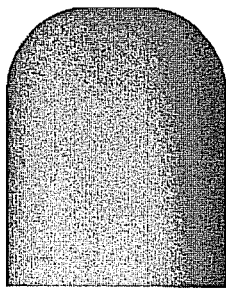
Attached Table 1 (concluded)

Unit: mm

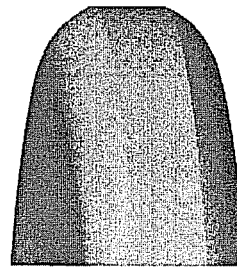
Surface imperfection type	Diagrammatic representation	Limiting dimension	Maximum limits of imperfections									
			Grade N O-rings with cross section $d_2$					Grade S O-rings with cross section $d_2$				
			$\leq 1.8$	$1.8 < \leq 2.65$	$2.65 < \leq 3.55$	$3.55 < \leq 5.3$	$5.3 < \leq 8$	$\leq 1.8$	$1.8 < \leq 2.65$	$2.65 < \leq 3.55$	$3.55 < \leq 5.3$	$5.3 < \leq 8$
Flow marks (radial orientation of flow marks is not permissible)		$j$	1.50 <sup>(1)</sup>	1.50 <sup>(1)</sup>	6.50 <sup>(1)</sup>	6.50 <sup>(1)</sup>	6.50 <sup>(1)</sup>	1.50 <sup>(2)</sup>	1.50 <sup>(2)</sup>	5.00 <sup>(2)</sup>	5.00 <sup>(2)</sup>	5.00 <sup>(2)</sup>
		$k$	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Non-fills and indentations (including parting line indentations)		$l$	0.60	0.80	1.00	1.30	1.70	0.15	0.25	0.40	0.63	1.00
		$m$	0.08	0.08	0.10	0.10	0.13	0.08	0.08	0.10	0.10	0.13
Notes <sup>(1)</sup> Or 0.05 $d_1$ , whichever is greater. <sup>(2)</sup> Or 0.03 $d_1$ , whichever is greater, subject to a maximum of 30 mm.												



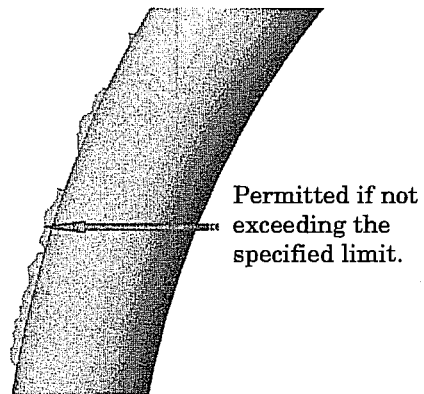
**Figure 1 Backrind**



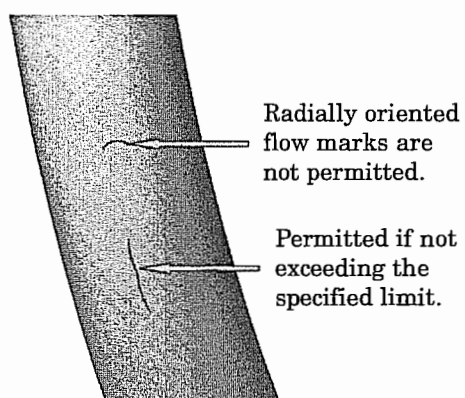
**Figure 2A Excessive trimming  
—Permitted**



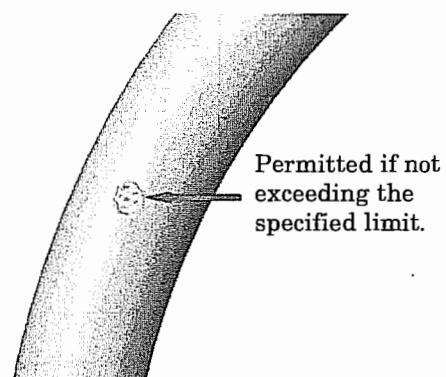
**Figure 2B Excessive trimming  
—Not permitted**



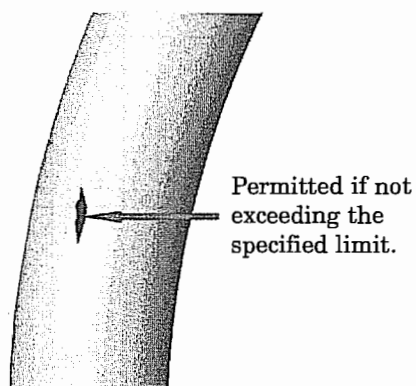
**Figure 3 Flash**



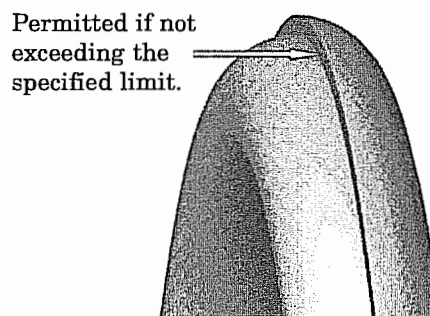
**Figure 4 Flow marks**



**Figure 5 Indentations due to mould contamination**



**Figure 6 Non-fills**



**Figure 7 Off register/  
mismatch/offset**

## Annex (informative)

### Comparison table between JIS and corresponding International Standard

JIS B 2408 : 2005 O-rings—Quality acceptance criteria					ISO/FDIS 3601-3 : 2002 Fluid power systems—O-rings— Part 3: Quality acceptance criteria		
(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause Location of deviation: text Indication method: dotted underlines or continuous sidelines		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Detail of technical deviation	
1 Scope	Specifies the acceptance criteria for visual quality of O-rings.	<b>ISO/FDIS 3601-3</b>	1	Specifies the quality acceptance criteria of O-rings, the dimensions of which are specified in <b>ISO 3601-1</b> .	MOD/ addition	<b>JIS</b> applies to all O-rings of diameters not greater than 8 mm.	<b>JIS</b> has a broader scope to include O-rings for general machinery, (P), (G) and (V), which are popularly used in Japan. They will be excluded from the scope as the use of <b>ISO</b> O-rings takes over.
2 Normative references	<b>JIS B 0142</b>		2	<b>ISO 3601-1</b> <b>ISO 5598</b>	IDT		
3 Terms and definitions	Definitions of 13 terms and those specified in <b>JIS B 0142</b> . Figures 1 to 7.		3	Definitions of 13 terms and those specified in <b>ISO 5598</b> . Figures 1 to 9.	MOD/ alteration	Figures from <b>ISO/FDIS 3601-3 : 2003</b> are referenced.	Preparation of <b>JIS</b> based on <b>ISO/FDIS 3601-3 : 2003</b> will be sought.
4 Symbols	Two symbols, $d_1$ and $d_2$ are specified.		4	Identical with <b>JIS</b> .	IDT		
5 Grades	Grade N Grade S		5	Identical with <b>JIS</b> .	IDT		

(I) Requirements in <b>JIS</b>		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between <b>JIS</b> and the International Standard by clause Location of deviation: text Indication method: dotted underlines or continuous sidelines		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Detail of technical deviation	
6 Surface condition	Specifies acceptable limits and other conditions for surface imperfections.		6	Identical with <b>JIS</b> .	IDT		
7 Identification statement	Reference to this Standard.		7	Identical with <b>JIS</b> .	IDT		

Designated degree of correspondence between **JIS** and International Standard: MOD

Remarks 1 Symbols in sub-columns of classification by clause in the above table indicate as follows:

- IDT: Identical in technical contents.
- MOD/addition: Adds specification item(s) or content(s) which are not included in International Standard.
- MOD/alteration: Alters the specification content(s) which are included in International Standard.

2 Symbol in column of designated degree of correspondence between **JIS** and International Standard in the above table indicates as follows:

- MOD: Modifies International Standard.



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